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Relationship Between Green Logistics Tendency and Logistics Performance: A Comparative Case Study on Logistics Service Providers

Yeşil Lojistik Eğilimi ve Lojistik Performans İlişkisi: Lojistik Hizmet Sağlayıcılar Üzerine Karşılaştırmalı Bir Vaka Çalışması

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ABSTRACT

Increasing concerns related to environmental side effects of the logistics services and competition between the logistics service providers are two pressuring factors on logistics service providers. This study seeks to explore the relation between green logistics tendency and logistic performance from the perspective of logistics service providers. In order to reach this aim, two logistics service providers are investigated by comparative case study method. Findings showed the effects of green logistics services on logistics performance components.

Keywords: Green Logistics, Logistics Performance, Logistics Service providers, Comparative case study

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ÖZET

Lojistik hizmetlerin çevresel yan etkileri ile ilgili artan endişeler ve lojistik hizmet sağlayıcılar arasındaki rekabet lojistik hizmet sağlayan işletmeler üzerinde baskı yaratan iki faktördür. Bu çalışmada, yeşil lojistik eğilimi ile lojistik performans arasındaki ilişkinin lojistik hizmet sağlayıcılar açısından ortaya koyulması amaçlanmıştır. Bu amaca yönelik olarak, iki lojistik hizmet sağlayıcı işletme karşılaştırmalı vaka analizi yöntemi ile incelenmiştir. Sonuçlar yeşil lojistik hizmetlerinin lojistik performans bileşenleri üzerindeki etkilerini göstermektedir.

Anahtar sözcükler: Yeşil Lojistik, Lojistik Performans, Lojistik Hizmet sağlayıcılar, Karşılaştırmalı Vaka Analizi

1. INTRODUCTION

As foreseen by Kirkpatrick (1990) environmentalism is one of the most important issues that shape up the businesses. At last decades, tremendous economic growth of the world provides new opportunities to humanity, enhance new technologies and increase global trade. However, it also causes serious environmental problems as global warming, ozone depletion, pollution of air and water ect. (Wu and Dunn, 2006). Meanwhile with the increasing environmental awareness by governments, policy makers, business and public all over the world, some methods have been defined in order to weaken these problems. This growing environmentalism trend reflect the industries (Banerjee, 2001).

Logistics industry also effected by environmentalism trend- as in every industry- and scope of the logistics have been diversified. Logistics service providers (LSP) also had to expand their services (Murphy and Poist, 2003). Therefore, logistics is a missing link of providing green products and services to customer with value adding logistics activities (Wu and Dunn, 2006) as cooperation with customer's company and its customer, green government regulations, environmental management system, green process design, reduction in energy consumption and green network design (Celik et al., 2016). With these capabilities, LSP achieves higher performance (Lai, 2004).

Major challenges of the global era stresses on LSP to survive and remain their competitiveness (Liu et al., 2010). Logistics performance measurement facilitates managing logistics operations under this conditions and provides information and good communication (Gunasekaran and Kobu, 2007). Likewise, green logistics services are contributing the competitive awareness of LSP (Isaksson and Huge-Brodin, 2013). There is a lack of knowledge and research on the link between the adoptions of green logistics services and logistics performance (Lin and Ho, 2008). Therefore, this paper contributes to a causal phenomenon between the impacts of green logistics services on LSP's performance. The paper is comparative case study of two LSP in the process of providing green logistics services based on logistics performance components.

Following this introduction, reviews of the logistics performance measures and green logistics in terms of the adoption decision, performance innovation and practices are presented. The research objectives and details of methodology used are discussed

in section 3. The results of the case study reported on section 4. The concluding section discusses the main findings and offers some further research and limitations.

2. LITERATURE REVIEW

Performance measurement systems (PMS) has broadened in the literature and practice in many forms as measures, metrics, indicators, and methods of measurement and performance measurement until 1960s (Choong, 2014). Therefore, performance measurement is a way of being successful through providing competitive advantage, modifying behavior and creating intelligence (Fawcett and Cooper, 1998). Although variety of PMS are proposed there is still no agreement in a common conceptualization (Choong, 2014).

Logistics performance is made up of many and different elements because of this complex nature it is too compelling to measure (Cagliano et al., 2009). Therefore, logistics performance measurement is regarded as complicated and challenging in spite of the importance attached (Forslund, 2011). Logistic performance measurement has indicated various indicators, attributes and measures in terms of different aspects and purposes (Wang et al., 2015). Several models and metrics have been presented in the literature. Cost, customer, information, time, resource, availability, productivity quality, utilization are some of the examples of these metrics (Najmi et al., 2013). Some of the widely used models are presented in Table 1.

Table 1. Summary of some important logistics performance measurement models.

Logistics Performances	**Items**	**Origin of the model**	**References**
Beamon's model	Resources, flexibility, output	Beamon, 1999	Beamon and Balcik, 2008
Caplice and Sheffi's model	Utilization, productivity, effectiveness.	Caplice and Sheffi, 1994	
Töyli et al.,' s model	Service level, operational metrics, logistics cost	Töyli et al., 2008	Muslimin et al., 2015
Aramyan et al.,'s model	Efficiency, flexibility, responsiveness, and quality	Aramyan et al., 2007	Bourlakis et al., 2014
Fugate et al.,'s model	Efficiency, effectiveness, and differentiation	Fugate et al., 2010	
Logistigual	Tangible components, ways of fulfillment, informative actions	Rafele, 2004	Leeuw and Beekman, 2008
Balance Scorecard	Financial perspective, Internal business perspective, customer perspective, innovation and learning perspective	Kaplan and Norton, 1992	Bhagwat and Sharma., 2007; Brewer and Speh 2000; Chia et al., 2009
SCOR	Reliability, responsiveness, agility, costs, asset management efficiency	Supply Chain Council	Lockamy and McCormack, 2004, Huan, Sheoran and Wang, 2004
Performance Prism	Stakeholder satisfaction, strategies, processes, capabilities, and stakeholder contribution.	Neely et al., 2002	Shaik and Abdul-Kader, 2013

Besides of the shown logistics performance references in above table, there are several studies that examined logistics performance including fast fashion industry (Cagliano et al., 2014), wine industry (Garcia et al., 2012), automotive industry, automotive and one in the chemical industry (Zimmermann and Seuring, 2009). When the related literature is considered, it is found that review of the logistics performance models and metrics are the mostly encountered studies (e.g. Gunesekaran and Kobu, 2007; Taticchi et al., 2014; Shepherd and Günter, 2006; Estampe et al., 2013).

Traditional logistics performance measurement models as Beamon's model, Aramyan et al.,'s model (2007) evaluate the effect of complexity of logistics system and they capture the general overview of these complex systems (Cagliano et al., 2009). In order to portray the effects of green logistics services on logistics performance, one of these models were used. Therefore, preliminary evidence of this relationship was tried to examined.

Despite the increasing concern on environment, there have been relatively few studies dealing with the environmental aspects of logistics (Murphy and Poist, 2003). Within this study green logistics literature reviewed in terms of the adoption decision, performance innovation and practices. Zhang et al., (2014) investigated the green logistics activities in China and describe the impact factors of the adoption of green logistics in truck fleets. The results suggested the adoption of green logistics practices. Additionally, Lin and Ho (2008) examined the influencing factors of adoption decision of green logistics practices. Explicitness and accumulation of green practices, organizational encouragement, quality of human resources, environmental uncertainty and governmental supports significantly guide to adopt green practices. Murphy and Poist (2003) compared the US and non-US firms' green logistics practices. Therefore, green logistics practices also investigated by Eltayeb et al., (2011), Isaksson and Huge-Brodin, (2013). Green logistics literature also composed of green logistics performance (Hung Lau, 2011, Björklund and Forslund, 2013), barriers of green logistics (Wooi and Zailani, 2010), green innovation (Zailani et al., 2011, Ho et al., 2009).

3. RESEARCH METHODOLOGY

This paper is based on comparative case studies concerning two LSP that provide green transport solutions. Case study provides a research strategy based on the notion of understanding the dynamics within single environment (Eisenhardt, 1989). Comparative case study contributes the richness of case study and compare the phenomenon in a systematic way (Ghauri, 2009). The research question "What is the relationship between the tendency of adopting green logistics and logistics performance" has been tried to answered by structured interviews based on the Aramyan model. Consistent with this aim, the case study method, which is useful for "why" and "how" questions (Lin and Ho, 2008), was found suitable for this study.

The responses were analyzed through cross case analysis which enhance generalizability and deepen the understanding and explanation (Miles et al., 2014).

3.1. Data Collection

Judgmental sampling, which is based on researcher's experience (Gofton and Ness, 1997), technique was used to select logistic companies that are successfully

implementing green practices. In order to determine sample, first the relevant logistics and transportation journals and websites on green logistic practices were reviewed and logistic service providers were compiled and analyzed. Within this list, two companies were selected which meet the aim of this study and they are especially known with their green logistics services in Turkey. Data collection details and case study details in terms of green logistics services of provided by the companies summarized in the Table 2.

These two cases were first examined independently and then compared. The data of the cases gathered by the semi structured face to face interviews based on the Aramyan model in April 2016.

The fictional names "A Logistics" and "B Logistics" are used because of the anonymity reasons. The details of the respondents, company name, some identical details were not disclosed in the study. However, it is intended to explain the nature of the sampling. Both companies operate as pioneering LSP have reputation with offering green services in logistics industry. A Logistics provides logistics solutions as road transport with a large fleet, air cargo transportation, maritime transportation, railway transportation, intermodal transportation, distribution, warehousing. B Logistics offers flexible solutions to customers as road transportation with road fleet of self-owned vehicles, maritime transportation, rail transportation with rail fleet of swapbodies, wagons and containers, air cargo transportation, intermodal transportation and warehousing and distribution centers. Besides, value added logistics services also provided by the company.

Table 2. Data Collection and Case Study Details

Data Collection	**A Logistics**	**B Logistics**
Time	April, 2016	April, 2016
Respondents	Sales manager	Customer representative
Conducted by	First author	First author
Analyzed by	First author + second author	First author + second author
Case Study Details	• Driver trainings • Efficient fleet • Offering intermodal solutions • Reduction of carbon dioxide emission, • Advanced tracking devices, • Fuel consumption and use of Euro 5 compliant vehicles • Green office practices	• Driver trainings • Efficient fleet • Offering intermodal solutions • Energy management • Advanced tracking devices, • Safety Management system • Reduction of water consumption • Waste management

4. RESULTS

- **Reasons of adopting green logistics services**

Although increasing affords to adopt green logistic practices, there is still long way to interiorize these practices. This adoption is a compelling innovation process for logistic service providers (Lin and Ho., 2008). It is started to be a criterion for the customer's selection of logistic service providers. In two cases, company's environmental awareness is one of the main reasons for adopting green logistics activities. The missions and values of both companies emphasizes the environmental awareness. Additionally, environmental programs of LSP are expected to have high standards and technology.

At both cases, adoption of green logistics practices also directed by the customer's demand. By this adoption they created superior customer value. Based on this result, customer satisfaction has increased and customer loyalty positively has influenced. Additionally, At B Logistics, besides of the protection of natural resources financial supports and grant programs are another reason for the adoption of green logistics services.

- **Effects of green logistics services on costs**

From the point of view A Logistics, green logistics have several impacts on costs. Nowadays, green logistics solutions are compulsory for global shippers. LSP are required to invest in these solutions to be able to fulfill the demand of their shippers and attract new shippers. However, these solutions as renewing the fleet, carbon footprint calculations, worker trainings, are accomplished with an increase in overall cost.

Both cases indicated that green logistics practices have an advantage over fuel costs. According to the B Logistics also depreciation costs and maintenance costs are decreasing because of the technically equipped vehicles. Additionally, model shift to rail and sea provides freight advantage. This results as a win-win situation in the sense that greener solutions both protect environment and provide advantage to logistic service providers.

- **Effects of green logistics services on flexibility**

In terms of the flexibility of green logistics services to respond to a changing environment, A Logistics reported that green logistics activities do not effected by changing environment such as changing routes and cargo volumes. With a proper planning of logistics operations, many restrictions can be handled most conveniently. However, B Logistics responded from the broader point of view. The adoption of greener logistics services depended on logistic service provider' s individual concern and it causes slow progress in Turkey. Therefore, various determinants effect the green logistic services as, costs, freight, technology, changing routes and cargo volume.

Additionally, customer complaints as a flexibility indicator was examined and both cases emphasized that there is no cause of complaint arouse from green logistics services.

- **Effects of green logistics services on responsiveness**

Considering the loss of time, A Logistics describe the modal shift to rail and sea gives a chance to reduce the total logistics lead time. Especially, intermodal transport provides shippers great advantage to increase their competitiveness. As for, B Logistics, loss of time depends on the planning of logistics operations. Right

planning and right equipment prevents the loss of time and that results in decrease at cost.

Examples from the both cases posit that shippers positively reacts to green logistics solutions. Such value added services also helps to gain new customers while avoiding losing already established shippers. On the other hand, sometimes shippers show some hesitations to adopt these greener solutions.

- **Effects of green logistics services on quality**

Obviously, both cases confirmed that green logistics activities positively affect the quality of the LSP. A Logistics mentioned the direct effect with easy access of information, time and cost savings, while B Logistics specified the use of advanced equipment.

5. DISCUSSION AND CONCLUSION

Strict competition in logistics industry directs LSP to offer new services and with the increasing environmental awareness green logistics services were initiated as a new competitive power. Under this circumstances, measurement of the performance gains importance because of the need to understand the current power of the LSP.

Logistics performance measurement models was examined briefly in this study and Aramyan's performance measurement model (2007) was considered to reveal the relationship between green logistics services and LSP performance. Although there are some negative implications on costs, green logistics services can improve the performance of the LSP based on key performance indicators as, quality, flexibility, cost and responsiveness. This provides an answer to research question of this study. Findings are consistent with the conclusions of Lin and Ho (2008) which expresses the perception of green innovations positive effect on performance.

Lin and Ho (2008) also presented the intentions to adopt green logistics services in Taiwan sample as explicitness and accumulation of green practices, organizational encouragement, quality of human resources, environmental uncertainty and governmental supports. However, in this study, it is suggested that customers' demand, environmental awareness and financial support are the reasons of adopting green logistics services.

This study is preliminary evaluation and has several limitations. Sampling of the study is restricted only two company and two interviewees. Wider sample can be preferred for the future studies. Additionally, existing explanatory model for performance measurement was used this study. It is recommended that future studies can developed through the use of more extensive measurement model and effect of green logistics services can be measured quantitatively.

6. REFERENCES

Kirkpatrick, D., "Environmentalism: the new crusade", *Fortune*, 12 February 1990, pp. 44-52.

Wu, H., Dunn, S., (2006). Evironmentally responsible logistics systems, *International Journal of Physical Distribution & Logistics Management* 25(2): 20 – 38.

Banerjee, S., (2001). Managerial perceptions of corporate environmentalism: interpretations from industry and strategic implications for organizations. *Journal of Management Studies* 38(4): 489-513.

Murphy, P. R., Poist, R. F., (2003). Green perspectives and practices: a "comparative logistics" study. *Supply Chain Management: An International Journal* 8(2): 122 – 131.

Celik, E., Erdogan, M., Gumus, A., (2016). An extended fuzzy TOPSIS–GRA method based on

different separation measures for green logistics service provider selection. *International Journal of Environmental Science and Technology* 13(5): 1377-1392.

Lai, K., (2004). Service capability and performance of logistics service providers. *Transportation Research Part E: Logistics and Transportation Review* 40(5): 385-399.

Liu, X., McKinnon, A., Grant, D., Feng, Y., (2010). Sources of competitiveness for logistics service providers: a UK industry perspective. *Logistics Research*. 2(1): 23-32.

Gunasekaran, A., Kobu, B., (2007). Performance measures and metrics in logistics and supply chain management: a review of recent literature (1995–2004) for research and applications. *International Journal of Production Research* 45(12): 2819-2840.

Isaksson, K., Huge-Brodin, M., (2013). Understanding efficiencies behind logistics service providers' green offerings. *Management Research Review* 36(3): 216-238.

Lin, C., Ho, Y., (2008). An Empirical Study on Logistics Service Providers' Intention to Adopt Green Innovations. *Journal of Technology Management and Innovation* 3(1): 17-26.

Choong, K. K., (2014). Has this large number of performance measurement publications contributed to its better understanding? A systematic review for research and applications, *International Journal of Production Research* 52(14): 4174-4197.

Fawcett, S., Cooper, M., (1998). Logistics Performance Measurement and Customer Success. *Industrial Marketing Management* 27(4): 341-357.

Cagliano, A.C., Carlin, A., Rafele, C. 2009. Understanding Supply Chain Complexity with Performance Measurement. In: 13th IFAC Symposium on Information Control Problems in Manufacturing, INCOM 2009, pp. 1126-1131, Moscow (Russia), 3-5 June 2009.

Forslund, H., (2011). The size of a logistics performance measurement systems. *Facilities* 29(3/4): 133 – 148.

Wang, M., Jie, F., Abareshi, A., (2015). Business logistics performance measurement in third-party logistics: An empirical analysis of Australian courier firms. *International Journal of Business and Information* 10(3): 323-336.

Najmi, A., Gholamian, M., Makui, A., (2013). Supply chain performance models: A literature review on approaches, techniques, and criteria. *Journal of Operations and Supply Chain Management* 6(2).

Beamon, B. M., (1999). Measuring supply chain performance. *International Journal of Operations & Production Management* 19(3): 275 – 292.

Beamon, B. M., Balcik, B., (2008). Performance measurement in humanitarian relief chains. International *Journal of Public Sector Management* 21(1): 4-25.

Caplice, C., Sheffi, Y., (1994). A Review and Evaluation of Logistics Metrics. *The International Journal of Logistics Management* 5(2): 11-28.

Töyli, J., Häkkinen, L., Ojala, L., Naula, T., (2008). Logistics and financial performance. *International Journal of Physical Distribution & Logistics Management* 38(1): 57-80.

Müslimin, H., Hai, S., Arniarnsyah, A., (2015). The relationship between logistics and financial performance of smes in Indonesia. Source of the Document. *International Journal of Applied Business and Economic Research* 13(7): 4805-4814.

Aramyan, L., Oude Lansink, A., van der Vorst, J., van Kooten, O., (2007). Performance measurement in agri-food supply chains: a case study. *Supply Chain Management: An International Journal* 12(4): 304-315.

Bourlakis, M., Maglaras, G., Aktas, E., Gallear, D., Fotopoulos, C., (2014). Firm size and sustainable performance in food supply chains: Insights from Greek SMEs. *International Journal of Production Economics* 152: 112-130.

Fugate, B., Mentzer, J., Stank, T., (2010). Logistics Performance: Efficiency, Effectiveness and Differentiation. *Journal of Business Logistics* 31(1): 43-62.

Rafele, C., (2004). Logistic service measurement: a reference framework. *Journal of Manufacturing Technology Management* 15(3): 280-290.

Leeuw, S., Beekman, L., (2008). Supply chain-oriented performance measurement for automotive

spare parts. *International Journal of Automotive Technology and Management* 8(1): 56.

Kaplan, R. S., Norton, D., (1992). The Balanced Scorecard: Measures that Drive Performance. *Harvard Business Review* 70 (1):71–79.

Bhagwat, R., Sharma, M. K., (2007). Performance measurement of supply chain management using the analytical hierarchy process. *Production Planning & Control* 18(8): 666-680.

Brewer, P. C., Speh, T. W., (2000). Using the balanced scorecard to measure supply chain performance. *Journal of Business Logistics* 21(1): 75-93.

Chia. A, Goh, M., Hum, S., (2009). Performance measurement in supply chain entities: balanced scorecard perspective. *Benchmarking: An International Journal* 16(5): 605 – 620.

Supply Chain Council., http://www.apics.org/sites/apics-supply-chain-council/benchmarking/scormark-process/scor-metrics. Access Date: 08.09.2016.

Lockamy, A., McCormack, K., (2004). Linking SCOR planning practices to supply chain performance. *International Journal of Operations & Production Management* 24(12): 1192-1218.

Huan, S., Sheoran, S., Wang, G., (2004). A review and analysis of supply chain operations reference (SCOR) model. *Supply Chain Management: An International Journal* 9(1): 23-29.

Neely, A., Adams, C., Kennerley, M. (2002). *The performance prism*. London: Financial Times/Prentice Hall.

Shaik, M., Abdul-Kader, W., (2013). Transportation in reverse logistics enterprise: a comprehensive performance measurement methodology. *Production Planning & Control* 24(6): 495-510.

Cagliano, A. C., Mustafa, M. S., Rafele, C. & Zenezini, G. (2014). Logistics Performance Measurement for Sustainability in the Fast Fashion Industry. Next Generation Supply Chains: Trends and Opportunities. Eds. Kersten, W., Blecker, T. and Ringle, C.M. epubli GmbH, Berlin.

Garcia, F., Marchetta, M., Camargo, M., Morel, L., Forradellas, R., (2012). A framework for measuring logistics performance in the wine industry. *International Journal of Production Economics* 135(1): 284-298.

Zimmermann, K., Seuring, S., (2009). Two case studies on developing, implementing and evaluating a balanced scorecard in distribution channel dyads. *International Journal of Logistics Research and Applications* 12(1): 63-81.

Taticchi, P., Garengo, P., Nudurupati, S., Tonelli, F., Pasqualino, R., (2014). A review of decision-support tools and performance measurement and sustainable supply chain management. *International Journal of Production Research* 53(21): 6473-6494.

Shepherd, C., Günter, H., (2006). Measuring supply chain performance: current research and future directions. *International Journal of Productivity and Performance Management* 55(3/4): 242-258.

Estampe, D., Lamouri, S., Paris, J., Brahim-Djelloul, S., (2013). A framework for analysing supply chain performance evaluation models. *International Journal of Production Economics* 142(2): 247-258.

Zhang, Y., Thompson, R., Bao, X., Jiang, Y., (2014). Analyzing the Promoting Factors for Adopting Green Logistics Practices: A Case Study of Road Freight Industry in Nanjing, China. *Procedia - Social and Behavioral Sciences* 125: 432-444.

Lin, C., Ho, Y., (2008). An Empirical Study on the Adoption of RFID Technology for Logistics Service Providers in China. *IBR*, 2(1).

Eltayeb, T., Zailani, S., Ramayah, T., (2011). Green supply chain initiatives among certified companies in Malaysia and environmental sustainability: Investigating the outcomes. Resources. *Conservation and Recycling* 55(5): 495-506.

Hung Lau, K., (2011). Benchmarking green logistics performance with a composite index. *Benchmarking: An International Journal* 18(6): 873-896.

Björklund, M., Forslund, H., (2013). The purpose and focus of environmental performance measurement systems in logistics. *International Journal of Productivity and Performance Management* 62(3): 230-249.

Wooi, G. C., Zailani, S., (2010). Green Supply Chain Initiatives: Investigation on the Barriers in the Context of SMEs in Malasia. *International Business Management* 4(1): 20-27.

Zailani, S., Amran, A., Jumadi, H., (2011). Greeen Innovation Adaption among Logistics Service Providers in Malasia: An Exploratory Study on Managers' Perceptions. *International Business Management* 5(3): 104-103.

Ho, Y., Lin, C., Chiang, S., (2009). Organizational determinants of green innovation implementation in the logistics industry. *International Journal of Organizational Innovation (Online)* 2(1): 3-12.

Eisenhardt, K., (1989). Building Theories from Case Study Research. *Academy of Management Review* 14(4): 532-550.

Ghauri, P. (2005). Designing and conducting case studies in international business research. Handbook of Qualitative Research Methods for International Business. Eds. Marschan-Piekkari and Welch. Cheltenham: Edward Elgar, 109-124.

Miles, M., Huberman, A. (2014). *Qualitative data analysis*. Thousand Oaks: Sage Publications.

Gofton, L., Ness, M. (1997). *Business market research*. Kogan Page, London.